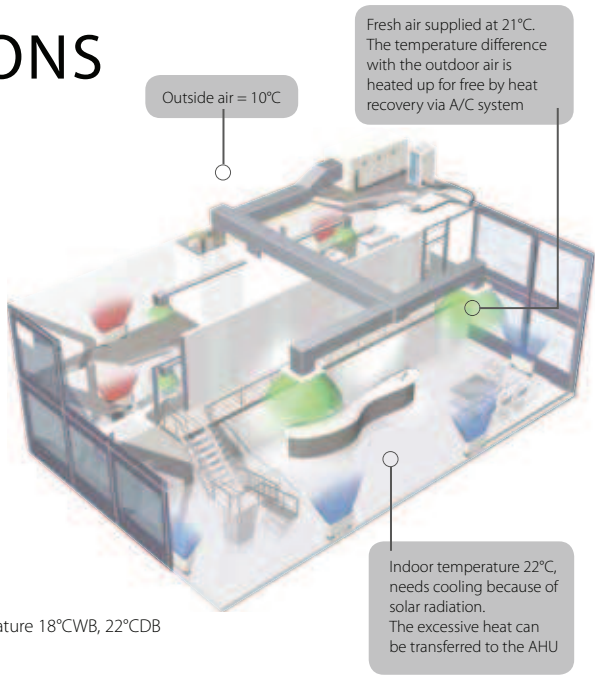
ERQ (PAIR) AND VRV®
AIR HANDLING APPLICATIONS

For small to large commercial spaces Daikin offers a range of R-410A inverter condensing units for use in conjunction with air handling units. In situations where Daikin commercial range ventilation units cannot satisfy the ventilation requirement due to building constraints (large atriums, banquet halls etc), air handling units represent the ideal solution.
Air handling units provide large fresh air volumes (> 1,000 m^3/h) and high ESPs enabling the use of extensive ductwork runs.

For more information on Daikin air handling units refer to the air handling unit catalogue.

BENEFITS OF ERQ AND VRV® AIR HANDLING APPLICATIONS


Outside air = 10°C
Fresh air supplied at 21°C. The temperature difference with the outdoor air is heated up for free by heat recovery via A/C system
Indoor temperature 22°C, needs cooling because of solar radiation.
The excessive heat can be transferred to the AHU

HIGH EFFICIENCY

Daikin heat pumps are renowned for their high energy efficiency with COPs up to 4.56 in heating[1]. The VRV® range offers both heat pump and heat recovery units with part load efficiencies as high as 9.02. Integrating the AHU with a heat recovery system is highly effective since an office system can frequently be in cooling mode while the outdoor air is too cold to be brought inside in an unconditioned state. In this case heat from the offices is merely transferred to heat up the cold incoming fresh air. In the absence of an AHU this 'free heating' the incoming fresh air would not be possible.

1 ERQ100AV1 heat pump
2 REYQ8P8 50% cooling – 50% heating load. Conditions: outdoor temperature 11°CDB, indoor temperature 18°CWB, 22°CDB

HIGH COMFORT LEVELS

Daikin ERQ and VRV® units respond rapidly to fluctuations in supply air temperature, resulting in a steady indoor temperature and resultant high comfort levels for the end user.

EASY DESIGN AND INSTALLATION

The system is easy to design and install since no additional water systems such as boilers, tanks and gas connections etc are required. This also reduces the total system cost.

TOTAL SOLUTION CONCEPT

Integrating an air handling unit into the total building climate system enables both design and installation procedures to based on a single common technology. This simplifies project follow-up, installation, commissioning and maintenance since only one party is involved.

WHICH SYSTEM OFFERS ME
THE BEST SOLUTION?

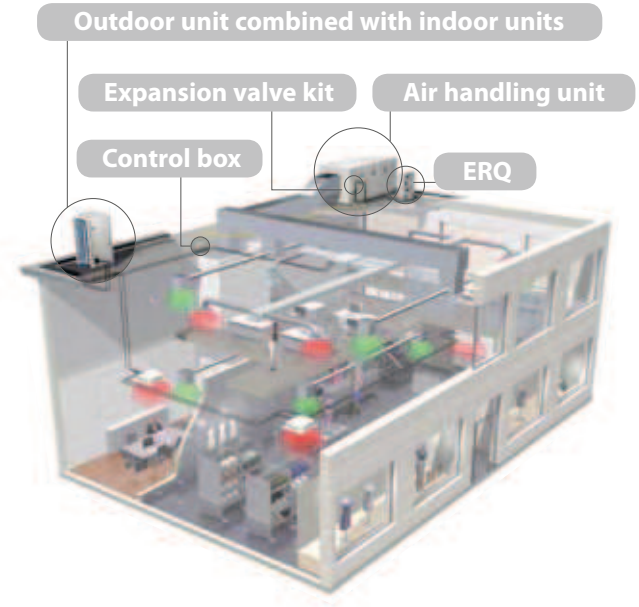
In order to maximise combination potential, Daikin offers 'pair' and 'multi' combination plus several expansion kits and control systems. Control box and expansion valve kits are required for each combination with an air handling unit. Both option kits are designed for indoor and outdoor installation and can be wall mounted.

I ONLY NEED A CONNECTION TO AN AIR HANDLING UNIT

A solution for your shop, warehouse, showroom or office.

ERQ heat pump

- Inverter controlled units
- Large capacity range (from 100 to 250 class)
- Heat pump
- R-410A
- Flexible control possibilities
- Wide range of expansion valve kits available



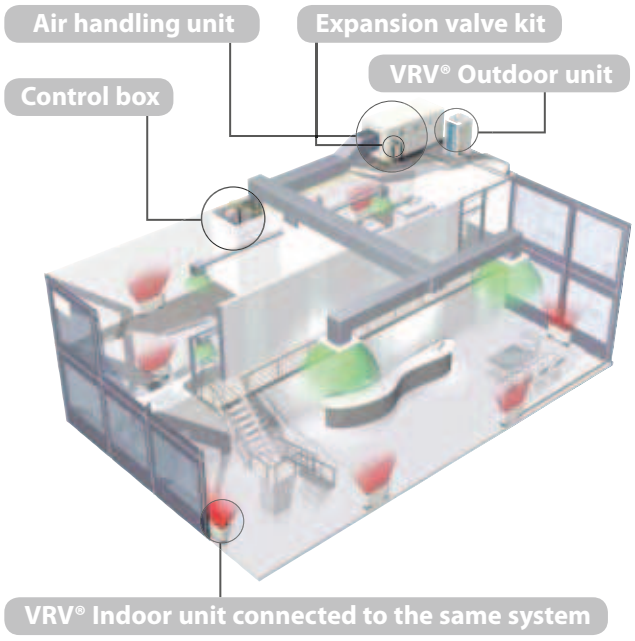
System	Type	4	5	6	8	10
Cooling capacity (kW)		11.2	14.0	15.5	22.4	28.0
Heating capacity (kW)		12.5	16.0	18.0	25.0	31.5
Air-cooled	ERQ-AV1	■	■	■		
	ERQ-AW1		■		■	■

I NEED AN AIR HANDLING UNIT AND HEATING, AND/OR COOLING

Integrate your air handling unit in a Total solution for your shop or office building.

VRV® heat recovery / heat pump

- Inverter controlled units
- Integrates in all VRV® heat recovery and heat pump systems up to 54 HP
- Provides virtually free heating for the air handling unit via recovered heat from indoor units in cooling[1]
- Control of air temperature via standard Daikin wired remote control
- Large range of expansion valve kits available

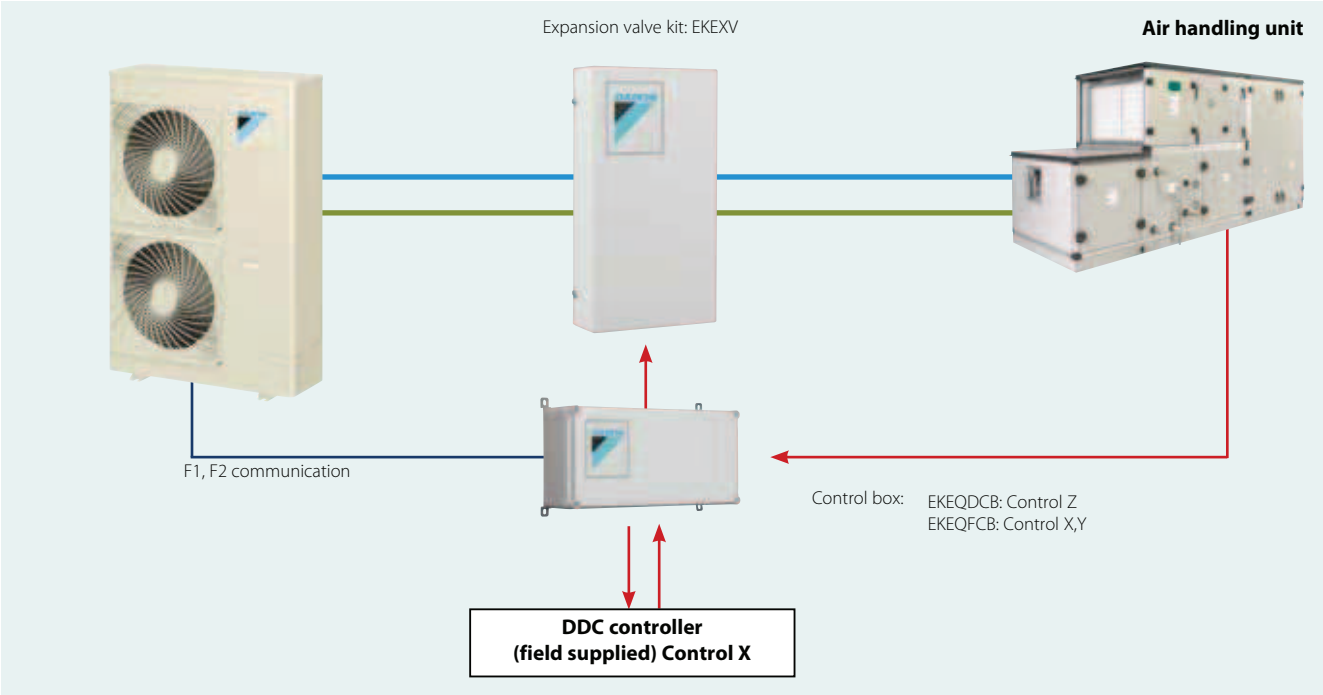


[1] In case of connection to a VRV® heat recovery outdoor unit
[2] For more information on VRV® units refer to the VRV® catalogue

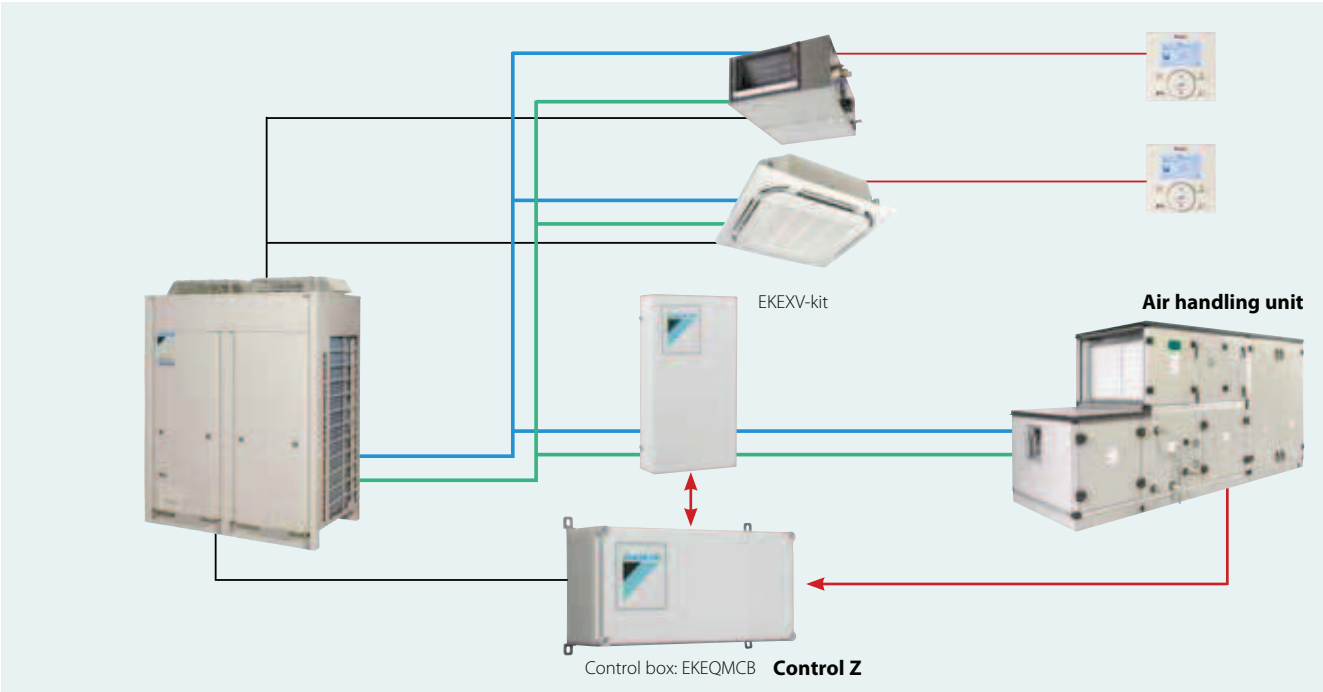
System	Type	4	5	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
Cooling capacity (kW)		11.2	14.0	15.5	22.4	28.0	33.5	40.0	45.0	49.0	55.9	61.5	67.0	71.4	77.0	82.5	89.0	94.0	98.0	105.0	111.0	116.0	120.0	126.0	132.0	138.0	143.0	147.0
Heating capacity (kW)		12.5	16.0	18.0	25.0	31.5	37.5	45.0	50.0	56.5	62.5	69.0	75.0	81.5	88.0	94.0	102.0	107.0	113.0	119.0	126.0	132.0	138.0	145.0	151.0	158.0	163.0	170.0
Air-cooled VRV®	Heat recovery				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Heat pump	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Water-cooled VRV®	Heat recovery				■	■			■	■	■		■	■	■	■												
	Heat pump				■	■			■	■	■		■	■	■	■												

SYSTEM OVERVIEW

Pair application: ERQ



Multi application: VRV®



Daikin communication wire (F1, F2 communication)

Other communication wire

Liquid pipe

Gas pipe

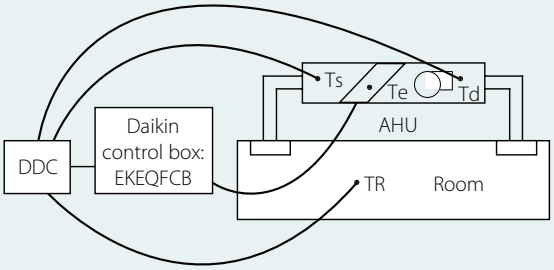
CONTROL POSSIBILITIES

In order to maximise installation flexibility, 3 types of control systems are offered:

POSSIBILITY X (TD/TR CONTROL):

Air temperature control via an external DDC controller (field supplied)

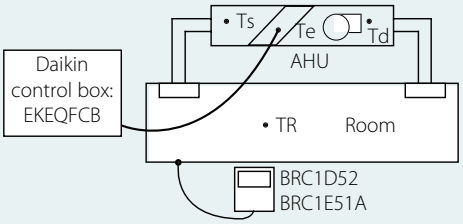
Room temperature is controlled as a function of the air handling unit suction or discharge air (customer selection). The DDC controller is translating the temperature difference between set point and air suction temperature (or air discharge temperature or room temperature) into a reference voltage (0-10V) which is transferred to the Daikin control box (EKEQFCBA). This reference voltage will be used as the main input value for the compressor frequency control.



POSSIBILITY Y (TE/TC CONTROL):

By fixed evaporating temperature

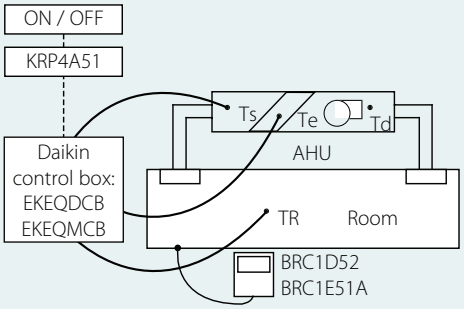
A fixed target evaporating temperature of between 3°C and 8°C can be set by the customer. In this case, room temperature is only indirectly controlled. The cooling load is determined from the actual evaporating temperature (i.e. load to the heat exchanger). A Daikin wired remote controller (BRC1D52 or BRC1E51A - optional) can be connected for error indication.



POSSIBILITY Z (TD/TR CONTROL):

Using Daikin wired remote controller (BRC1D52 or BRC1E51A - optional)

Set point can be fixed via standard Daikin wired remote controller. Remote ON/OFF can be achieved by an optional adapter KRP4A51.
No external DDC controller should be connected. The cooling load is determined from the air suction temperature and set point on the Daikin controller.



Ts = Air suction temperature
Td = Air discharge temperature
Tr = Room temperature
Te = Evaporating temperature
AHU = Air Handling Unit
DDC = Digital Display Controller

	OPTION KIT	FEATURES
Possibility x	EKEQFCB	Field supplied DDC controller is required Temperature control using air suction or air discharge temperature
Possibility y		Using fixed evaporating temperature, no set point can be set using remote controller
Possibility z	EKEQDCB EKEQMCB*	Using Daikin wired remote controller BRC1D52 or BRC1E51A Temperature control using air suction temperature

* EKEQMCB (for 'multi' application)

SELECTION OF AIR HANDLING UNITS

PAIR APPLICATION

Step 1: Select required capacity of AHU

Based on the required capacity of the AHU please select the expansion valve

Step 1

	Allowed heat exchanger volume (dm³)		Allowed heat exchanger capacity in coolong (kW)			Allowed heat exchanger capacity in heating (kW)		
EKEXV class	Minimum	Maximum	Minimum	Standard	Maximum	Minimum	Standard	Maximum
63	1.66	2.08	6.3	7.1	7.8	7.1	8.0	8.8
80	2.09	2.64	7.9	9.0	9.9	8.9	10.0	11.1
100	2.65	3.3	10	11.2	12.3	11.2	12.5	13.8
125	3.31	4.12	12.4	14.0	15.4	13.9	16.0	17.3
140	4.13	4.62	15.5	16.0	17.6	17.4	18.0	19.8
200	4.63	6.6	17.7	22.4	24.6	19.9	25.0	27.7
250	6.61	8.25	24.7	28.0	30.8	27.8	31.5	34.7

Heat exchanger capacity is defined under following conditions:
Saturated suction temperature (SST) = 6°C, Superheat (SH) = 5K
Subcool condensor (SC) = 3K
Air temperature = 27°CDB/19°CWB

Eg: If you need 14kW in cooling, you will require an expansion valve of 125class (EKEXV125).

The heat exchanger capacity has priority over the volume of the heat exchanger and is therefore the determining factor for the selection of the expansion valve. More information on the volume can be found in the data book and service manual.

Step 2: Select outdoor unit

Pair combinations with ERQ outdoor units are possible based on the same principle as standard DX units. The capacity of the AHU unit is indicated by the capacity of the expansion valve and can be connected as indicated in below table.

Step 2

OUTDOOR UNIT			CONTROL BOX		EXPANSION VALVE KIT						
			Control z	Control x or y	Class 63	Class 80	Class 100	Class 125	Class 140	Class 200	Class 250
			EKEQDCB	EKEQFCB	EKEXV63	EKEXV80	EKEXV100	EKEXV125	EKEXV140	EKEXV200	EKEXV250
ERQ	1~	ERQ100AV1	P	P	P	P	P	P	-	-	-
		ERQ125AV1	P	P	P	P	P	P	P	-	-
		ERQ140AV1	P	P	-	P	P	P	P	-	-
	3~	ERQ125AW1	P	P	P	P	P	P	P	-	-
		ERQ200AW1	P	P	-	-	P	P	P	P	P
		ERQ250AW1	P	P	-	-	-	P	P	P	P

P: Pair, combination depending on AHU coil volume and capacity

Eg: Based on above selected expansion valve, the EKEXV125 has a capacity of class 125. Therefore we can choose to connect it in pair with all outdoor units indicated in the table above with P.

Step 3: Control box selection

Please make your selection of the control box based on your requirements. All the different control possibilities are mentioned on page 34.
More information on the selection is available in the service manual.

MULTI APPLICATION

Step 1: Select required capacity of AHU

Based on the required capacity of the AHU please select the expansion valve

EKEXV class	Allowed heat exchanger volume (dm³)		Step 1 Allowed heat exchanger capacity in cooling (kW)			Allowed heat exchanger capacity in heating (kW)		
	Minimum	Maximum	Minimum	Standard	Maximum	Minimum	Standard	Maximum
50	0.76	1.65	5.0	5.6	6.2	5.6	6.3	7.0
63	1.66	2.08	6.3	6.9	7.1	7.8	7.1	8.0	8.8
80	2.09	2.64	7.9	9.0	9.9	8.9	10.0	11.1
100	2.65	3.3	10	11.2	12.3	11.2	12.5	13.8
125	3.31	4.12	12.4	14.0	15.4	13.9	16.0	17.3
140	4.13	4.62	15.5	16.0	17.6	17.4	18.0	19.8
200	4.63	6.6	17.7	22.4	24.6	19.9	25.0	27.7
250	6.61	8.25	24.7	28.0	30.8	27.8	31.5	34.7

Eg: If the required capacity of the AHU is 6.9kW in cooling, which lies between 6.3 and 7.8, the EKEXV63 can be selected.

The heat exchanger capacity has priority over the volume of the heat exchanger and is therefore the determining factor for the selection of the expansion valve. More information on the volume can be found in the data book and service manual.

Step 2: Select outdoor unit

Multiple AHU can be connected to a VRV® system and the connection principle is similar as for ERQ. Connection of the full system can be up till 110% including at least 1 Daikin indoor unit (cassette, duct, …) The capacity index of the AHU needs to be calculated based on the indicated capacity of the selected expansion valve and the actual capacity.
The AHU capacity index = capacity class (expansion valve) * ratio (actual capacity AHU / standard capacity expansion valve)

Eg: AHU has a capacity requirement of 6.9kW and the selected expansion valvue is the EKEXV63 with a standard capacity of 7.1kW. So the AHU capacity = 63 * (6.9kW / 7.1kW) = 61 class
In case that in the system 2 FXSQ50 class are connected, the total sum of capacity would be 61 + 2*50 = 161 class
Based on the 161 class a 10 HP is required as outdoor unit.

[1] For detailed specifications of VRV® outdoor units, refer to the VRV® catalogue or databooks

Step 3: Control box selection

EKEQMCB is the control box which is required to control the communication between the AHU and the VRV® system beside the standard communication of the Daikin DX indoor units (cassette, duct, wall…).
More information on the selection is available in the service manual.

ERQ

Air handling application (pair)

SPECIFICATIONS

OUTDOOR UNIT					ERQ100AV1	ERQ125AV1	ERQ140AV1	ERQ125AW1	ERQ200AW1	ERQ250AW1
Capacity range				HP	4	5	6	5	8	10
Cooling capacity	Nom.			kW	11.2 (1)	14.0 (1)	15.5 (1)	14.0 (1)	22.4 (1)	28.0 (1)
Heating capacity	Nom.			kW	12.5 (2)	16.0 (2)	18.0 (2)	16.0 (2)	25.0 (2)	31.5 (2)
Capacity control	Cooling	Min./Max.		%	24/100			100		
Power input	Cooling	Nom.		kW	-			3.52 (1)	5.22 (1)	7.42 (1)
	Heating	Nom.		kW	-			4.00 (2)	5.56 (2)	7.70 (2)
EER					3.99 (1)		3.42 (1)	3.98 (1)	4.29 (1)	3.77 (1)
COP					4.56 (2)	4.15 (2)	3.94 (2)	4.00 (2)	4.50 (2)	4.09 (2)
Casing	Material				Painted galvanized steel plate			Painted galvanized steel plate		
Dimensions	Unit	HeightxWidthxDepth		mm	1,345x900x320			1,680x635x765	1,680x930x765	
Weight	Unit			kg	120			159	187	240
Fan	Type				Propeller			Propeller		
	Air flow rate	Cooling	Nom.	m^3/min	106			95	171	185
		Heating	Nom.	m^3/min	102	105		95	171	185
Sound power level	Cooling	Nom.		dBA	66	67	69	72	78	
Sound pressure level	Cooling	Nom.		dBA	50	51	53	54	57	58
	Heating	Nom.		dBA	52	53	55	-		
Compressor	Model				JT100G-VDL			Inverter		
	Type				Hermetically sealed scroll compressor			Hermetically sealed scroll compressor		
Compressor 2	Model				-			-		ON - OFF
	Type				-			-		Hermetically sealed scroll
Operation range	Cooling	Min.~ Max.		°CDB	-5~ 46			-5~ 43		
	Heating	Min.~Max.		°CWB	-20~15.5			-20~15		
Entering air temperature on AHU heat exchanger	Cooling	Min.~ Max.		°CDB	-14CWB~25CWB			35°CDB		
	Heating	Min.~Max.		°CWB	10CWB~27CWB			10CWB~27CWB		
Refrigerant	Type				R-410A			R-410A		
	Charge			kg	4.0			6.2	7.7	8.4
	Control				Expansion valve (electronic type)			Electronic expansion valve		
Refrigerant oil	Type				Daphne FVC68D			Synthetic (ether) oil		
	Charged volume			l	1.5			1.7	2.1	4.3
Piping connections	Liquid	Type/OD		mm	Flare connection/9.52			Braze connection/9.52		
	Gas	Type/OD		mm	Flare connection/15.9		Braze connection/19.1	Braze connection/15.9	Braze connection/19.1	Braze connection/22.2
	Drain	Quantity/OD		mm	3/26x3			-		
	Piping length	Max.	OU - IU	m	55			55		
	Heat insulation				Both liquid and gas pipes			Both liquid and gas pipes		
Power supply	Phase/Frequency/Voltage			Hz/V	1N~/50/220-440			3N~/50/400		

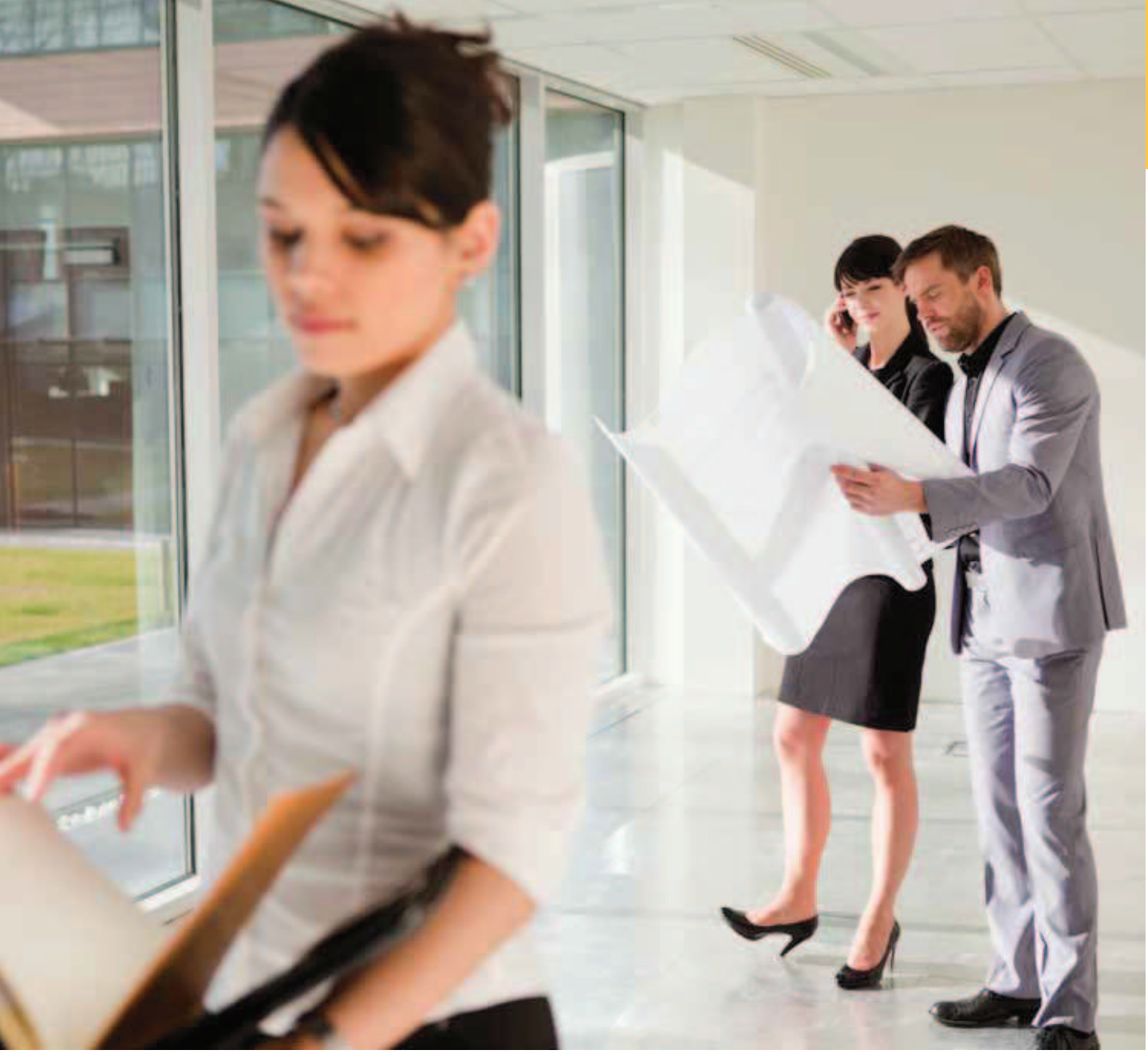
(1) Cooling: indoor temp. 27°CDB, 19°CWB; outdoor temp. 35°CDB; equivalent piping length: 7.5m (horizontal); level difference: 0m
(2) Heating: indoor temp. 20°CDB; outdoor temp. 7°CDB, 6°CWB; equivalent refrigerant piping: 7.5m; level difference: 0m
(3) Sound pressure level is a relative value, depending on the distance and acoustic environment. For more details, please refer to the sound level drawings.
(4) Sound values are measured in a semi-anechoic room.
(5) Sound pressure level is a relative value, depending on the distance and acoustic environment. For more details, please refer to the sound level drawings.

EKEXV

Control box

INDOOR UNIT				EKEXV50	EKEXV63	EKEXV80	EKEXV100	EKEXV125	EKEXV140	EKEXV200	EKEXV250
Casing	Material			Metal							
Dimensions	Unit	HeightxWidthxDepth	mm	401x215x78							
Weight	Unit		kg	2.9							
Sound pressure level	Nom.		dBA	45							
Operation range	Cooling	Min.~ Max.	°CDB	-5.0~ 46.0							

(1)The sound pressure value is the maximum value measured at 10cm from the motor.(2)Minimum and maximum piping length refer to the piping between the expansion valve kit (EKEXV) and the air handling unit(3)Equivalent piping length: refer to the capacity connection ratio of the outdoor unit; depends on outdoor unit(4)Maximum installation height difference: See manual; depends on outdoor unit



ACCESSORIES

ERQ	ERQ100AV1	ERQ125AV1	ERQ140AV1	ERQ125AW1	ERQ200AW1	ERQ250AW1
Central drain pan	-	-	-	KWC26B160	KWC26B280	
Central drain plug	KKPJ5F180			-	-	-
Cool/heat selector	KRC19-26A6					
Fixing box	KJB111A					

EKEQ	EKEQFCB	EKEQDCB	EKEQMCB
Wired remote control	BRC1D52 / BRC1E51A	BRC1D52 / BRC1E51A*	
Wiring adapter for electrical appendices	-	KRP4A516	
Remote sensor	-	KRCS01-1	

* Cool/heat selector: required for operation.

Caution for options

- Do not connect the system to DIII-net devices (Intelligent Controller, Intelligent Manager, LonWorks interface, BACnet interface…). This could result in malfunction or breakdown of the total system.
- Only use the ERQ, EKEQ, EKEXV in combination with an air handling unit. Do not connect this system to other indoor units.

In all of us, a green heart

Daikin's unique position as a manufacturer of air conditioning equipment, compressors and refrigerants has led to its close involvement in environmental issues. For several years Daikin has had the intention to become a leader in the provision of products that have limited impact on the environment. This challenge demands the eco design and development of a wide range of products and an energy management system, resulting in energy conservation and a reduction of waste.

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